

# **DO THE ARMY AND AIR FORCE SEE EYE TO EYE ON BDA?**

**A MONOGRAPH  
BY  
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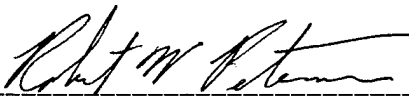
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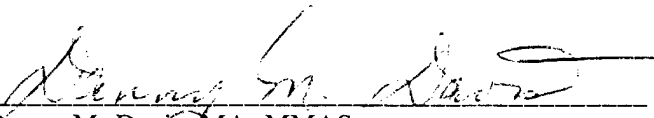
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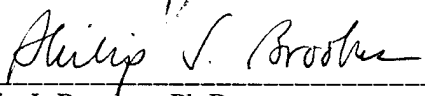
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## ABSTRACT

DO THE ARMY AND AIR FORCE SEE EYE TO EYE ON BATTLE DAMAGE ASSESSMENT?  
by Maj Judy M. Graffis, USAF, 53 pages.

This monograph studies the use of the term battle damage assessment (BDA) within the Army, Air Force, and Joint communities. The monograph uses history, official publications, and materials published by military personnel or contractors to assess understandings of BDA representative of larger groups of personnel. It determines perceptions according to service and also according to whether the document is an official, scholarly, or popular publication.

The monograph finds that the Army expects BDA to be delivered much more quickly than the Air Force requires. The Army is satisfied with BDA only on high-priority missions, while the Air Force wants BDA on every mission. However, the most significant finding is that there is no agreement on who BDA is for. Until the 1970s, the primary purpose for BDA was to provide feedback to weapon system operators and their support systems. Within each service and the joint community some writers again claim this purpose. Since the 1970s, however, most voices have seen and continue to see the operational commander as the primary user of BDA. This creates confusion between BDA and a more inclusive concept, Combat Assessment. The original (feedback) purpose for BDA is valuable and deserves more consideration.

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A Monograph

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## Table of Contents

	Page
I. Introduction.....	1
II. History.....	3
III. Methodology.....	7
IV. Research Results.....	10
V. Analysis.....	30
VI. Conclusion.....	38
Endnotes.....	40
Appendix.....	47
Bibliography.....	50
Illustrations:	
Figure 1: Nine Document Categories.....	8
Figure 2: Nichols Research Corporation relationship between BDA timeliness, accuracy, and target type.....	13
Table 1: Summary of Air Force Perspectives of BDA.....	19
Table 2: Summary of Army Perspectives of BDA.....	26
Table 3: Summary of Joint Perspectives of BDA.....	30

## I. INTRODUCTION

Even though there was enough general (Battle Damage Assessment) information to enable CINCCENT (Commander in Chief, US Central Command) to prosecute the war, some targets that had been destroyed may have been struck again and some that had not been destroyed may have been neglected. Targeting at the theater and tactical levels was less effective in the absence of more precise damage assessment.<sup>1</sup>

*Department of Defense, Final Report to Congress on the Conduct of the Persian Gulf War, 1992*

The core analysis problem of Operation Desert Storm centers on tactical battlefield damage assessment, the count of Iraqi tanks, armored personnel carriers and artillery pieces knocked out by the air campaign before the ground offensive kicked off. This was the greatest challenge and the greatest failure of the intelligence community in Operation Desert Storm.<sup>2</sup>

*Oversight and Investigations Subcommittee, Committee on Armed Services, US House of Representatives, 1993*

Since commencement of the ground campaign required knowledge of the effects of airstrikes, accurate Bomb Damage Assessment (BDA) of the attacks against the enemy ground forces was critical to the war effort. Unfortunately, there were differences in the estimates provided by theater and national BDA efforts....

It is not yet known--and probably will never be known--which estimate was closest to ground truth; however, it is apparent from the diversity of the estimates and contentiousness that arose in the process that the capabilities for obtaining timely and accurate tactical battlefield BDA were lacking in Desert Storm.<sup>3</sup>

*Institute for Defense Analyses Support to the Commission on Roles and Missions of the Armed Forces, 1995*

In 1992, the Defense Department, in its *Final Report to Congress on the Conduct of the Persian Gulf War*, identified the Battle Damage Assessment (BDA) process as one of four intelligence shortcomings in the Persian Gulf War.<sup>4</sup> Despite numerous working groups and studies, such as the Institute for Defense Analyses study quoted above, no clear solution has yet been devised. LtCol Kevin Smith (USAF), in an Air University Research Report, finds that

Army and Air Force exercises do not realistically practice the BDA process.<sup>5</sup> A General Accounting Office (GAO) report on the effectiveness of Precision Guided Munitions released in July 1996 confirms that the BDA problems noted during DESERT STORM continue today.<sup>6</sup>

Why does this issue persist? One possible explanation is that the real problem is one of understanding another service's needs. That is, the Air Force could probably determine how to assess Air Force-produced battle damage for Air Force use, and the Army could do the same for Army-produced strikes and Army use. However, DESERT STORM showed that each service needs information the other produces. Each service, to properly conduct and assess its strikes, and use that information effectively for future operations, must know specific information about the enemy, including damage the other services may have already done to its targets or to separate but related targets. In other words, single service BDA systems cannot fix the problem as currently understood.

If neither service can set up a satisfactory BDA process separate from the other service, they must coordinate to develop the function. To coordinate, the services need to speak the same language. When an Air Force action officer works with his or her Army counterpart, are they using the same words in the same ways? This monograph will answer this question by studying popular, scholarly, and official writings produced by personnel within the two services. The research will gain an understanding of how important the issue of BDA is to each service, as well as any differences in how it is viewed. Chapter II will provide a historical perspective on Battle Damage Assessment. Chapter III will explain the methodology used in Chapters IV and V to research the question. Chapter VI will show concluding thoughts and recommendations for future work.



## II. HISTORY

The term "battle damage assessment" has been in common use only since 1992, when an Intelligence Community Battle Damage Assessment Working Group standardized the phrase and its definition.<sup>7</sup> The terminology, referred to in this paper as the Defense Intelligence Agency (DIA) definition, states,

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BDA is the timely and accurate estimate of damage resulting from the application of military force, either lethal or non-lethal, against a pre-determined objective. BDA can be applied to the employment of all types of weapon systems (air, ground, naval, and special forces) throughout the range of military operations. BDA is primarily an intelligence responsibility with required inputs and coordination from the operators. BDA is composed of physical damage assessment, functional damage assessment, and target system assessment.<sup>8</sup>

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Prior to 1992, the closest Defense Department-wide term was "bomb damage assessment." Bomb damage assessment was first defined in Joint Publication 1, *Department of Defense (DOD) Dictionary of Military and Associated Terms*, in 1972. The definition referred only to air attacks.<sup>9</sup> The most closely related term, "post strike reconnaissance," also began standard use in the 1972 dictionary.<sup>10</sup> Prior to this publication, there was no standardized term to reflect any type of assessment of attack. The 1972 definitions carried through successive dictionaries to the 1989 version.

The next dictionary, published in 1994, retained the definitions for bomb damage assessment and post strike reconnaissance. However, it also included DIA's definition for battle damage assessment as well as for combat assessment, a broader term which includes battle damage assessment as a component.<sup>11</sup> Thus, 1994 was the first year that the term battle damage

assessment was accepted for DOD-wide use. The history of BDA, then, must deal primarily with the concept, not the term.

Battle Damage Assessment in its simplest form is the measurement of the success of an attack on enemy forces. Obviously, this function has been necessary throughout the history of war. It has always served at least two purposes. First, it guides the commander on how best to use his force, based on both the current condition of the enemy and the demonstrated ability of his own force to affect the enemy. Second, it provides feedback to the individual soldier on his personal effectiveness against the enemy.<sup>12</sup>

Historically, measuring the success of an attack has been relatively easy to do. Until relatively recent times, commanders could do their own assessments instantaneously because they could see their entire battlefields. There was rarely significant doubt as to how the battle was going. For example, the Bible records a story of the Israelites fighting the Amalekites. The leader of the Israelites, Moses, stood on the top of a hill. As long as Moses held his hands up, "The Israelites were winning, but whenever he lowered his hands, the Amalekites were winning."<sup>13</sup> Clearly, assessing how the fight was going was not difficult.

Historically, individual fighters also could usually personally assess their performance on the battlefield. They could see the enemy they were engaging, whether it was with arrows, spears, or the sword.

As warfare changed during and after the Napoleonic era, it became harder for both the commander and the individual to assess their current situations. The size of the battlefield expanded to the extent that commanders could no longer survey the entire battlefield themselves; they required reports from subordinates as to how the battle was going. The methods by which commanders could receive such information, however, were also

increasing. For example, the French army formed the world's first balloon company in 1794. Battlefield observation was a primary mission.<sup>14</sup>

Individual soldiers of the nineteenth century also were becoming more dependent on others for feedback on their effectiveness. For example, indirect fire weapons, specifically artillery, began playing a larger role on the battlefield. At least as early as 1861 artillery officers were making use of observers in balloons to help adjust fire.<sup>15</sup> By 1910, French artillery regulations specified that the direct fire mode should be used only by exception, and that indirect fire was the primary mode.<sup>16</sup> Therefore, at least one combat arm, artillery, could not see the effects of its actions and, like the commanders, required reports from others to determine its effectiveness.

Aerial observers, as major sources of the required assessment information for both the artillery and the commander, were perhaps the first personnel to see the BDA concept as a primary function. The airplane has been used in support of BDA at least since 1913, when LT Henry "Hap" Arnold first directed artillery fire from an aircraft.<sup>17</sup>

By World War I, aerial observers identified artillery adjustment, a form of BDA, as a major function.<sup>18</sup> This effort increased throughout the war, and carried into World War II. For example, the 1942 version of Army Air Forces Field Manual 1-20, *Tactics and Techniques of Air Reconnaissance and Observation*, defined one of its primary functions as the "artillery mission." This mission was "a flight for the purpose of locating artillery targets, adjusting artillery fire, reporting the effect of fire, or for the surveillance of scheduled artillery fire and enemy activity (emphasis added)."<sup>19</sup> In addition, FM 1-20 noted that long range artillery "must be furnished with air observation" if it were to be effective.<sup>20</sup>

World War II also brought air interdiction and strategic bombing to full view in warfare. BDA of air strikes became a major mission for reconnaissance assets. FM 1-20 stated, "Reconnaissance aviation supports the striking aviation in air attack by...determining the results of attack."<sup>21</sup>

Even as World War II techniques showed the need to assess effectiveness of attacks, they were generally geared to provide that information only to the shooters to improve their effectiveness, not to the commander as information for his decision-making. In 1953, for example, FM 6-20 thoroughly discussed post-strike analysis completely in the context of improving artillery strike effectiveness. The 1973 version of FM 6-20, *Field Artillery Tactics and Operations*, stated the position most clearly. It said,

The combat intelligence function of the field army results in two basic intelligence products: Decision-oriented intelligence and target intelligence. The force commander employs decision-oriented intelligence in the design and execution of maneuver; he employs target intelligence in the application of firepower.<sup>22</sup>

The clear implication of this manual and its predecessors was that the commander did not require BDA to make his maneuver decisions. He used it to make his artillery more effective.

FM 30-5, *Combat Intelligence*, also published in 1973, however, saw assessment as useful for planning operations.<sup>23</sup> In 1984, a shift to using strike assessment for operational decision-making became much more apparent. The Army published FM 34-1, *Intelligence and Electronic Warfare Operations*, which stated,

The intelligence assessment of targets before and after the attack is essential in the air-land battle. The commander must keep follow-on echelons away from the Main Battle Area until the close battle is won. Only by knowledge of the effectiveness of deep battle actions will the commander be able to see the accomplishment of this part of the mission.<sup>24</sup>

From here, it was only a short step to DESERT STORM, where commanders expected to use BDA to help them make their operational decisions, but most BDA production was designed to provide feedback only to the shooters.

### III. METHODOLOGY

This monograph uses several different types of written material to depict Air Force, Army, and Joint perspectives on the concept of BDA. It uses a methodology somewhat similar to A. J. Bacevich's work, *The Pentomic Era: The US Army Between Korea and Vietnam*. LTC Bacevich studied statements by senior military officials and articles in military journals to "understand the mind-set of the officer corps at a particular time."<sup>25</sup> He found that articles in military journals, in particular, reflected what the military, in general, was thinking.

This monograph first categorizes materials by their authors' basic service perspectives. That is, they are written by Air Force personnel, Army personnel, or personnel who are expected to have a joint perspective. Authors are expected to have a joint perspective if they are specifically writing on behalf of a joint agency or for a joint agency-sponsored journal. Otherwise, they retain their parent service's perspective. Contractors are placed with the service or joint agency which hired them.

Next, the monograph categorizes materials by their publication source and intended audience. Again, there are three basic types. A document is considered "popular" if it is published in a journal with an intended audience of field-grade officers and below, and if the journal welcomes articles written by active duty personnel. A document is considered "scholarly" if it was written as a major paper (thesis or monograph) toward completion of a master's degree, intermediate service school, or senior service school. In addition, papers which were written for official purposes, but have not

attained the status of official doctrine or policy, are included here. These include contractor-produced studies, proposed doctrine, and proposed policy. The final category by publication source is "official." These documents have been published for use as official guidance by their respective services or by the joint community.

This categorization produces nine categories for comparison, as shown in Figure 1.

Air Force-Popular	Air Force-Scholarly	Air Force-Official
Army-Popular	Army-Scholarly	Army-Official
Joint-Popular	Joint-Scholarly	Joint-Official

Figure 1. Nine Document Categories

After each document is categorized, it is assessed for its implied or direct response to three questions: "What is BDA?," "What are the necessary characteristics of BDA?," and "Who is BDA for?" These three questions are designed to determine what, if any, significant differences exist among the nine categories of documents concerning the basic concept of BDA. The results of the basic categorization and responses to the three questions are compiled in Chapter IV.

Chapter IV is organized to provide the results of the three questions for each category, in turn. That is, Air Force popular journal responses to all three questions are followed by Air Force scholarly document responses to all three questions, then Air Force official publication responses to all three questions, and similarly through Army and Joint materials. At the end of each service's perspective, a table summarizes that service's responses. In addition,

The appendix contains bibliographical references for all materials used, by category.

Chapter V analyses the results recorded in Chapter IV. It compares perspectives on BDA across services and across document type, and assesses why similarities and differences exist where they do.

#### *Scope and Limitations*

The monograph compares all materials available to the author through the US Army's Combined Arms Research Library, including Interlibrary Loan, and through personal contacts. The materials are limited to the post DESERT STORM time period, except for official publications. If a current official publication was published prior to DESERT STORM, it is considered appropriate for comparison. The post DESERT STORM limitation was chosen to limit the amount of material for research and due to a significant increase in BDA-related publications after DESERT STORM.

This monograph does not address US Navy or Marine Corps perspectives. The author chose not to research their perspectives to help limit the amount of material for research. However, materials seen during research indicate that Navy and Marine Corps personnel also are involved in on-going discussions about BDA.

The scope of the comparison covers three basic questions, as stated above, to limit the collection of data and to give the data a basic form in which comparison across categories would be possible. Where significant information about a document's perspective on BDA does not fit into one of the three questions, that information is recorded with the most closely related question.

The author may refer to BDA in such a way that may imply physical damage to a target. This is only for convenience; all references to physical

damage can be applied to electronic interference, information damage, and other forms of non-physical damage.

### *Definitions*

Two characteristics of BDA which will be referred to are "completeness" and "comprehensiveness." In this monograph, completeness refers to the production of a full picture of the damage a strike produced. For example, a complete report on a strike on an electrical transformer might state that, not only was the transformer destroyed, but there is also a power outage for a 30 mile radius for at least 24 hours. Comprehensive reporting produces BDA for every strike conducted.

Responses to the question, "Who is BDA for?" will be categorized to the extent possible into the two functions of BDA already noted--the commander, and the shooter, or operator of a weapon system. Commanders are users of BDA if it is used to make maneuver decisions such as re-strike, move to next phase of operation, etc. Shooters are users of BDA if it is used as feedback to improve the shooting process.

## IV. RESEARCH RESULTS

### Air Force Popular Materials

To assess the perspective of popular Air Force writings on BDA, the author reviewed articles in *Air Force Magazine*, *USAF Weapons Review* and *Airpower Journal*. However, only one article, Capt John Glock's "The Evolution of Air Force Targeting," even mentions BDA.<sup>26</sup> Beyond that article, BDA as a subject is not reported in the popular journals for US Air Force personnel. Possible explanations for this nearly complete lack of material include: BDA is not of interest to Air Force junior and mid-grade officers; officers are interested, but do not believe they have a proper forum in the currently



available popular journals; officers are interested, but the Air Force culture does not encourage article writing to the extent it is encouraged in the Army.

There is anecdotal evidence for all three explanations. For example, concerning the first possibility, the Air Force's Weapons School, its premier education program for aircraft tactics and intelligence support to combat operations, does not currently teach BDA to either its aircrew or its intelligence-specialty students.<sup>27</sup>

Evidence for both the second and third explanations lies in the fact that the Air Force sponsors only one tactical-level journal, *Weapons Review*, and one operational-level journal, *Airpower Journal*. The Army, on the other hand, as will be seen later in the paper, has many such journals. Air Force personnel apparently do not write enough to maintain more than the two already-mentioned journals, and they only have two possible places to go with their ideas.

*What is BDA?*

Capt Glock's article does not define BDA.

*What are the necessary characteristics of BDA?*

Capt Glock recognizes accuracy, completeness and comprehensiveness as essential characteristics.

*Who is BDA for?*

Capt Glock sees BDA as supporting the commander responsible for theater air operations. For example, he notes that, during the Korean War, Far East Air Forces was unable to accurately determine the effectiveness of its air operations due to the lack of combat assessment.<sup>28</sup>

#### Air Force Scholarly Materials

Four scholarly papers were reviewed. Nichols Research Corporation, contracted by Air Force Materiel Command to model the BDA process, has done

several studies on BDA.<sup>29</sup> LtCol Richard B. H. Lewis (USAF), Special Assistant to BrigGen Buster Glosson, Central Command Air Forces Director of Campaign Plans during the Gulf War, wrote an Army War College monograph that deals extensively with the issue of BDA during DESERT STORM.<sup>30</sup> LtCol Kevin W. Smith (USAF), in an Airpower Research Institute sponsored paper, thoroughly explored BDA problems and processes while advocating greater use of cockpit video to aid in resolving the problems.<sup>31</sup> Mr. Lewis D. Hill, Air Combat Command's Command Targeteer, produced a position paper advocating establishment of an Air Combat Command position on the concept and techniques of Combat Assessment. The paper has not yet been designated official policy.<sup>32</sup>

*What is BDA?*

Addressing the first question, Nichols Research Corporation states that, "BDA entails the gathering of information to examine targets and strike results."<sup>33</sup> It is a "measure of success used to assess an attack's impact on the enemy's ability to conduct combat operations."<sup>34</sup> Nichols also uses the standardized BDA terminology codified by the Intelligence Community-wide BDA Working Group in October 92.

LtCol Lewis, from his perspective at the side of BrigGen Glosson, never gives a definition for BDA. Rather, he goes directly to the operational impact of several different methods for assessing it.

LtCol Smith approaches the 'what is BDA' problem head-on, blaming the lack of a standard answer for some of the problems surrounding BDA. He applauds DIA's work at establishing a common definition and accepts DIA's definition as appropriate.<sup>35</sup>

Mr. Lewis Hill shows a deep involvement in BDA in his draft position paper. He recognizes the importance of definition and repeats DIA's official version. He continues,

The BDA process answers the following questions:

- (1) Did the weapons impact the target as planned?
- (2) Did the weapons achieve the desired results and fulfill the objectives, and therefore purpose, of the attack?
- (3) How long will it take enemy forces to repair damage and regain functionality?
- (4) Can and will the enemy compensate for the actual damage through substitution?
- (5) Are restrikes necessary to inflict additional damage, to delay recovery efforts, or attack targets not successfully struck?
- (6) What are the collateral effects on the target system as a whole, or on other target systems?<sup>36</sup>

*What are the necessary characteristics of BDA?*

Concerning the necessary characteristics of BDA, Nichols Research Corporation clearly recognizes that maximum timeliness and accuracy are both necessary, but finds "the relationship between BDA timeliness and fidelity are driven by the target and battlefield situation." This relationship is illustrated in Figure 2.

Characteristic:	Shortest Timeline	Highest Accuracy	
Target Type:	SCUD TEL	Runway Denial	Underground C2

Fig 2. Nichols Research Corporation relationship between BDA timeliness, accuracy and target type.<sup>37</sup>

Nichols uses several measures of performance to assess BDA's value: decision accuracy for re-strike of a target by another aircraft vs. time; air campaign length vs. decision accuracy; number of unnecessary strikes; decision timeliness; decision accuracy vs. weather; campaign length vs. weapon performance; and attrition of aircraft participating in the campaign.<sup>38</sup> From

these performance measures, it appears that timeliness and accuracy are primary requirements for BDA.

LtCol Lewis notes that a valid determination of BDA during DESERT STORM focused on accuracy, timeliness, and comprehensiveness, but also depended heavily on what organization was performing and using the BDA. For example, "The navy felt that pilot misreps (mission reports) were sufficient."<sup>39</sup> Army Forces Central Command (ARCENT), however, would count a tank as killed in only two circumstances--either an A-10 mission report (misrep) stated it had been killed, or Imagery Intelligence (IMINT) or Signals Intelligence (SIGINT) stated the tank had probably been killed or destroyed.<sup>40</sup> Later in the air war but before the ground war, "DIA forced ARCENT into...changing their BDA kill criteria. Now, only a third of A-10 and half of F-111F, F-15E, or A-6 kills were credited."<sup>41</sup> Clearly, a characteristic of BDA is accuracy, but it depends on who you are as to how many sources and what types of sources you need to determine that a given assessment is accurate enough.

Concerning timeliness, Lewis reports that during DESERT STORM VII corps often submitted targets for strike, even though those targets had already been struck. Unfortunately, the corps had not yet received BDA and needed to know that the targets had been destroyed. Rather than wait for forthcoming BDA that might say the target had not been destroyed, they submitted important targets for re-strike before the first strike's BDA had been received. Lewis saw this procedure as inappropriate, but also was unable to get BDA to the corps fast enough to prevent it.<sup>42</sup> He does note that overhead system BDA would get to the corps level no earlier than four days after a target had been struck, and implies that this was far too long a time lag.<sup>43</sup>

Lewis also sees comprehensiveness as necessary. He notes that "unless the corps was tracking individual pilot mission reports for all aircraft in their Area of Responsibility (AOR), many targets were hit without corps knowledge."<sup>44</sup> Yet, "no correlation (between army and air operations center intelligence data bases) was attempted for targets reported destroyed by the Air Force, especially when coordinates did not agree exactly with the corps data base."<sup>45</sup> The corps, even though apparently desiring an assessment of every target struck in their AORs, seemed incapable of producing such an assessment.

LtCol Smith generally agrees with LtCol Lewis concerning characteristics of BDA. Smith notes "accuracy of DESERT STORM intelligence estimates, and in particular bomb damage assessment, was the single most controversial issue within the armed services during the entire air campaign."<sup>46</sup> He also finds that timeliness and comprehensiveness are essential, and again, the system has been found wanting. He states, "attrition counts were key measures of campaign progress and helped determine the timing for the ground offensive. Once the ground campaign began, commanders needed almost real-time information to facilitate tactical decisions, a need which further taxed the BDA system."<sup>47</sup>

Mr. Hill's view of necessary characteristics starts with his six questions, stated above, which help define BDA. He clearly nominates accuracy as necessary, and implies that comprehensiveness and completeness are valuable. With respect to timeliness,

BDA must be tailored to the decision maker and phased into the planning and execution cycles. Inputs into assessments must be planned and scheduled....Instantaneous ground truth is impossible...Comprehensive BDA requires too much time even in a perfect world. This drives the phasing of BDA. The time phases should therefore correspond to the planning cycle.

Phase 1 BDA: Less than 24 hours...Affects ATO execution.  
Phase 2 BDA: 1-3 Days...Affects ATO generation.  
Phase 3 BDA: 4 Days and longer...Affects air operations planning  
and theater campaign planning.<sup>48</sup>

Here, Hill uses the ATO cycle as the most important means of determining timeliness. If the BDA gained is sufficient to appropriately affect the ATO, it is timely enough. In this aspect, he is very similar to the Nichols Research Corporation Report.

*Who is BDA for?*

Nichols does not directly address this question. However, the measures of performance and actual experimentation focus exclusively on the flow of BDA within the ATO cycle, without regard for other uses for BDA. Thus, although it does not explicitly state who BDA is for, Nichols clearly implies BDA is for the JFACC, the commander responsible for the ATO.

LtCol Lewis, on the other hand, sees that tactical ground commanders need BDA. He states, the "CINC designated both ARCENT and MARCENT responsible for assessing battle damage in their AOR, since each was to conduct a major attack within their AOR."<sup>49</sup> In addition, during the air-only war "army corps commanders had a difficult time assessing JFACC support in their AORs."<sup>50</sup> For example, "Corps commanders were concerned that they were not getting enough air allocated to the enemy's front line divisions...(they) were worried about breaching and the CINC was worried about (the enemy's) theater reserves."<sup>51</sup> LtCol Lewis recognizes the ground commanders had these difficulties because they were not getting much BDA before the ground war started. The air campaign accomplished what the ground commanders wanted, but those commanders had no way to know it. The ground truth of JFACC support was that "during VII Corps' breaching on G-

Day, not one artillery round was fired into friendly troops. GEN Schwarzkopf thought that the scheme of maneuver...could take up to 21 days....Coalition ground forces completed operations in four versus 21 days."<sup>52</sup>

LtCol Smith has a broad view of who needs BDA. He finds requirements at the brigade and wing level, at the corps level, and at theater level. For example, for both the air wing and the Air Operations Center "BDA provides an essential source of data for identifying weapons deficiencies, fuze reliability, target vulnerability, optimum delivery targets, delivery accuracy, and planning adequacy. Individual target and munition assessments provide data for target system analyses, reconstitution estimates, weaponeering, and restrike requirements."<sup>53</sup> Concerning ground commanders' needs Smith, like Lewis, notes that "ground tactical commanders were not confident with the tactical intelligence picture as G-Day approached."<sup>54</sup>

Who does Mr. Hill see as his audience for BDA? From his list of six questions helping to define BDA, Hill clearly sees many different audiences, from the ground tactical commander to the Joint Force Commander. However, his primary focus throughout his paper is on the Joint Force Commander as the customer.

#### Air Force Official Materials

Four official Air Force publications were reviewed. Air Force Doctrine Document (AFDD) 50, *Intelligence*, provides basic doctrine for all Air Force intelligence functions.<sup>55</sup> Air Force Instruction (AFI) 14-207, *Air Force Targeting*, establishes basic responsibilities and defines terms with respect to targeting.<sup>56</sup> Air Force Pamphlet (AFP) 200-17, *An Introduction to Air Force Targeting*, provides more detailed information about the targeting process.<sup>57</sup> The *JFACC Primer* guides JFACCs in their functions.<sup>58</sup>

*What is BDA?*

AFDD 50, while giving BDA a prominent place in intelligence doctrine, does not define it. AFI 14-207 defines BDA simply as, "Did the strike(s) achieve the desired damage to the targets?"<sup>59</sup> The purpose of BDA, in conjunction with two other aspects of combat assessment, is to "recommend restrike(s), as appropriate," and to be used as a "principal input to initiate the targeting cycle, as required."<sup>60</sup>

AFP 200-17 defines BDA as follows:

BDA is an evaluation of the effects of strikes against individual targets that provides essential data for target and target system analyses, reconstitution estimates, weaponeering inputs, data base updates, and restrike requirements.<sup>61</sup>

AFP 200-17 continues its definition with five questions very similar to Mr. Lewis Hill's six questions noted earlier.

The *JFACC Primer* also does not define BDA. Although the first key tenet of air campaign planning requires a clear definition of success, BDA, or even general combat assessment, is not a major focus for the JFACC or the JFACC's intelligence support.<sup>62</sup>

*What are the necessary characteristics of BDA?*

AFDD 50 expects timeliness and accuracy as necessary BDA characteristics, and does not attempt comprehensiveness. It states,

Intelligence personnel evaluate incoming data on combat operations and revise target nomination priorities. High priority targets are closely monitored to ensure strike execution and desired level of destruction....Additionally, AOC BDA responsibilities depend on rapid and accurate information on targets in order to assess combat effectiveness.<sup>63</sup>

In AFI 14-207, BDA must be accurate. AFP 200-17 indicates that timeliness, accuracy, and completeness are the needed characteristics. The *JFACC Primer*,



as noted above, does not address BDA specifically, and therefore does not note necessary characteristics.

*Who is BDA for?*

AFDD 50 names the J-3, but specifies that targeting missions (i.e., the ATO) also have top priority. "The Joint Staff J-2...activates an interagency BDA cell to directly support targeting missions. Combatant command J-2s...act as overall BDA validation authority, and support the J-3 in the combat assessment process."<sup>64</sup>

AFI 14-207, AFP 200-17 and the *JFACC Primer* all see BDA primarily used to support the ATO cycle. The essential question is whether a target needs re-strike. Given that this is a JFACC decision, the BDA directly supports the JFACC. AFP 200-17 also recognizes a requirement at the aircrew level for performance feedback.

Air Force Materials Summary

Table 1 summarizes the review of Air Force materials. The appendix contains a bibliography of all Air Force material used.

Table 1. Summary of Air Force Perspectives of BDA

	DEFINITION	CHARACTERISTICS	CUSTOMER
<b>POPULAR</b>	No Definition	1. Accurate/ Complete/ Comprehensive	1. Cdr (JFACC)
<b>SCHOLARLY</b>	Timely and accurate estimate of damage resulting from the application of military force against a predetermined objective (DIA)	1. Timely (within 24 hours) 2. Accurate 3. Comprehensive 4. Complete	1. Cdr (JFACC) 2. Cdrs (tactical and operational level)/shooters 3. JFC
<b>OFFICIAL</b>	Evaluation of the effects of strikes against individual targets...	1. Accurate 2. Timely 3. Complete 4. NOT comprehensive	1. Cdr (JFACC) 2. J-3 3. Shooters

### Army Popular Materials

The author found nine articles discussing BDA in popular journals for US Army personnel. Eight articles are in the branch-specific publications *Military Intelligence* (three) and *Field Artillery* (five). One article is in *Military Review*, the US Army journal that most closely corresponds to the US Air Force's *Airpower Journal*.

#### *What is BDA?*

Most articles do not define BDA. In two articles, BDA is separated from Target Damage Assessment (TDA). That is, "BDA tracks the overall damage to the enemy, while TDA evaluates the damage done to a specific target."<sup>65</sup> It appears that the definition of BDA is considered common knowledge within the Army. Indeed, all of the articles appear to start from an agreed understanding that BDA is the measure of success of an attack on the enemy.

#### *What are the necessary characteristics of BDA?*

The most common requirement is for accuracy. Seven out of nine articles directly or indirectly require an accurate assessment of damage inflicted on the enemy. Two of the seven are willing to accept estimates of this damage, particularly with artillery, and one of those defines the acceptable accuracy of the estimate to be within 5% of the actual damage caused.<sup>66</sup> Timeliness ranks next in importance, with five authors emphasizing it. The most common word used to describe appropriate timeliness is "immediate." Three articles support comprehensiveness, advocating methods to track all missions that have been executed against their reported BDA. However, two other authors specifically note that not all strikes require damage assessment. Not all targets are "critical enough to tie up collectors for TDA."<sup>67</sup>

Completeness, gaining a full picture of all the damage caused, is mentioned in one article.

#### *Who is BDA for?*

Most of the popular articles identified commanders at varying levels as the primary users of BDA, and several stressed that BDA is an essential aspect of the tactical decision-making process. One article states that "faulty BDA can lead to grave errors in the tactical decision-making process".<sup>68</sup> Seven authors focus on the division commander, although two of those articles believe BDA supports the brigade commander as well, and one goes on down to the battalion commander.

One article, specifically discussing theater BDA (i.e., Air Interdiction BDA), sees the Land Component Commander as the user of BDA, and one article sees BDA as primarily to improve field artillery support at the brigade and division level.

#### Army Scholarly Materials

US Army scholarly materials on BDA are also available. One contractor report, two monographs by US Army officers, and one United States Army Intelligence Center (USAIC) paper were reviewed. Bevilacqua Research Corporation produced a report, *Development and Demonstration of a Multi-Level Neural Network for Battle Damage Assessment*, for the Army Research Laboratory.<sup>69</sup> LTC David W. Cammons wrote *US Army Intelligence in Support of the 100-Hour War: Fact or Fiction/Myth or Reality?* for the School of Advanced Military Studies.<sup>70</sup> COL Steven A. Epkins wrote *A Division G2's Perspective on Operations Desert Shield and Desert Storm* for the US Army War College, examining his experiences as the 82nd Airborne Division G2.<sup>71</sup> The USAIC published *Proposed Doctrine and Tactics, Techniques, and Procedures for Army Battle Damage Assessment* in 1993 that has not become official doctrine, but

has had impact on official Army publications including FM 34-1, *Intelligence and Electronic Warfare Operations*.<sup>72</sup>

*What is BDA?*

Bevilacqua Research Corporation notes the use within the Army of both BDA and TDA, and adds, "The terminology used in the TDA/BDA community can be confusing at times due to the difference in terminology in use between the intelligence and operations communities."<sup>73</sup> Bevilacqua uses DIA's definition of BDA.<sup>74</sup>

LTC Cammons explains BDA as a vital aspect of shaping the battlefield. BDA is "the feedback the Commander receives on the status of the pre-conditions he set as a prelude to mission execution."<sup>75</sup>

COL Epkins does not provide a definition of BDA, but associates it with the assessment of combat effectiveness of the enemy forces opposing his division.<sup>76</sup>

The USAIC defines BDA identically to Bevilacqua and DIA, except that it does not specify the three assessments which make up BDA.<sup>77</sup>

*What are the necessary characteristics of BDA?*

Bevilacqua's use of the DIA definition automatically defines timeliness and accuracy as necessary. Bevilacqua specifically aimed for a timeliness of less than 60 minutes.<sup>78</sup>

LTC Cammons emphasizes comprehensiveness and accuracy. Concerning comprehensiveness, he finds that a major problem in the Army's ability to fulfill its requirements for BDA in DESERT STORM was that the US Air Force chose to allocate reconnaissance aircraft to other purposes, but the Army depended heavily on the Air Force for reconnaissance assets.<sup>79</sup> Accuracy is a double-edged sword. Army Forces Central Command (ARCENT) had a numerical goal, 50% for reduction of Iraqi armor and artillery, for

initiation of the ground campaign. To properly assess when the 50% mark was reached obviously required accuracy. On the other hand, LTC Cammons also asserts that commanders had an unrealistic expectation for exact intelligence. The requirement, and therefore expectation for exact intelligence, created unnecessary tension between commanders and their intelligence support.

The real problem was that Commanders believed there was intelligence in theater that would help keep their troops alive, and they could not get it. The war only brought more fog and increased the Commanders (sic) sense of isolation from 'the real intel.'<sup>80</sup>

COL Epkins sees a need for accuracy and completeness. During DESERT SHIELD and STORM, he was frustrated by the receipt from higher echelons of BDA which contained no analytical comments to explain how the aggregate BDA assessments of combat effectiveness were determined.<sup>81</sup> In addition, although he sees it as unrealistic, Epkins desires comprehensiveness in his BDA.<sup>82</sup>

USAIC's definition of BDA again emphasizes timeliness and accuracy. In its discussion, USAIC also states that BDA must be objective.<sup>83</sup> This is essentially the same as accurate. USAIC also advocates, but does not require, completeness in reporting.<sup>84</sup> Similarly, USAIC desires comprehensiveness, but states that "competing requirements usually limit BDA collection and exploitation opportunities to the high payoff targets that most directly impact on the commander's objectives."<sup>85</sup>

*Who is BDA for?*

Bevilacqua's research aims BDA specifically at the "Deep Attack Commander" within the "Automated Deep Operations Coordination Cell."<sup>86</sup> This places Bevilacqua's emphasis on the chief of the Deep Operations Coordination Cell at division, corps and theater levels.

LTC Cammons recognizes commanders at all levels as users of BDA. Any commander who establishes pre-conditions prior to executing a mission, and orders specific operations to achieve those pre-conditions, requires BDA.<sup>87</sup> COL Epkins, as a division G2 relating his experiences, focuses exclusively on the division commander. USAIC agrees with LTC Cammons' assessment.<sup>88</sup>

#### Army Official Materials

Four US Army publications were reviewed. US Army Field Manual (FM) 34-1, *Intelligence and Electronic Warfare Operations* establishes basic doctrine for Military Intelligence operations.<sup>89</sup> FM 34-130, *Intelligence Preparation of the Battlefield* guides the intelligence effort in support of operations.<sup>90</sup> FM 6-20-10, *Tactics, Techniques and Procedures for the Targeting Process* describes current targeting methodology.<sup>91</sup> FM 71-100, *Division Operations* provides doctrine for Army divisions.<sup>92</sup>

#### *What is BDA?*

Three of the four manuals (FMs 34-1, 34-130, and 6-20-10) use DIA's definition.<sup>93</sup> FM 71-100, however, describes BDA as "an analysis of the results of a military operation for physical damage and its impact on enemy combat effectiveness."<sup>94</sup>

#### *What are the necessary characteristics of BDA?*

The DIA definition found in FMs 34-1, 34-130, and 6-20-10 carries with it two characteristics, timeliness and accuracy. It also explicitly recognizes, however, that BDA must be estimated. Both FM 34-1 and FM 6-20-10 note that comprehensiveness is not a requirement, but that only certain targets must be assessed.<sup>95</sup> FM 71-100 does not specify characteristics for BDA.

*Who is BDA for?*

FM 34-1 and FM 6-20-10 recognize all tactical commanders as users of BDA. FM 6-20-10 also acknowledges the shooters as requiring BDA. FM 6-20-10 explains,

At the tactical level, commanders use BDA to get a series of timely and accurate *snapshots* (emphasis in original) of their effect on the enemy. It provides commanders an estimate of the enemy's combat effectiveness, capabilities, and intentions. This helps commanders determine when or if their targeting effort is accomplishing their objectives.

As part of the targeting process, BDA helps to determine if restrike is necessary. Commanders use this information to allocate or redirect attack systems to make the best use of available combat power.<sup>96</sup>

FM 71-100 sees BDA from the perspective of the division. It expects BDA to provide insight into the enemy's course of action and to measure the success of the targeting effort.<sup>97</sup> Therefore, the division commander appears to be the final user of BDA, but the commander's intelligence and fire support personnel are the primary users.

Army Materials Summary

Table 2 summarizes the review of Army materials. The appendix contains a bibliography of all Army materials used.

Table 2. Summary of Army Perspectives of BDA

	DEFINITION	CHARACTERISTICS	CUSTOMER
<b>POPULAR</b>	1. Implied-measure of success of attack 2. Overall damage to the enemy (not damage to a specific target)	1. Accurate 2. Timely- "Immediate" 3. Comprehensive	1. Cdr- usually Div. 2. Shooters
<b>SCHOLARLY</b>	1. Timely and accurate estimate of damage resulting from the application of military force (DIA) 2. Status of pre-conditions for mission execution	1. Accurate 2. Comprehensive 3. Timely- less than 60 minutes 4. Complete	1. Cdrs at all levels. 2. Div Cdr 3. DOCC Chief (cdr and shooter)
<b>OFFICIAL</b>	1. DIA 2. Analysis of the results of a military operation for physical damage and its impact.	1. Timely 2. Accurate 3. NOT comprehensive	1. Cdrs at all levels. 2. Shooters/ Intelligence

#### Joint Popular Materials

Popular journals aimed at providing a joint perspective on operational issues consist of the *Joint Force Quarterly* and the *Air Land Sea Bulletin* (formerly *Air Land Bulletin*). The *Joint Force Quarterly* contains no articles concerned with targeting or BDA. Its articles generally reflect a higher-level perspective (operational and strategic topics) than even *Airpower Journal* and *Military Review*; the fact that it contains no articles mentioning BDA is not surprising. The *Air Land Sea Bulletin*, on the other hand, would appear to be ideally focused for issues like BDA. It does contain frequent articles on targeting, but none focused on BDA. The author found three articles recognizing the role of BDA.



*What is BDA?*

None of the three articles reviewed defines BDA. As with the Army's popular materials, there appears to be a basic assumption of common understanding of the term. That common understanding seems to be the same as the Army's, that BDA is a measure of the success of an attack.

*What are the necessary characteristics of BDA?*

Two articles indicate a need for comprehensiveness, while one adds completeness, and one calls for timeliness, using the descriptor "expeditious."<sup>98</sup>

*Who is BDA for?*

Each article sees BDA as ultimately supporting the commander. The commander may be of a Joint Task Force, Corps, or Special Operations unit, depending on the focus of the article.

#### Joint Scholarly Materials

The author found one contractor paper which was written to provide a joint perspective. The Institute for Defense Analyses (IDA) was tasked by the Congressionally mandated Commission on Roles and Missions of the Armed Forces to assist the Commission in answering the following question; "Is the current assignment of roles and responsibilities among the Services, Combatant Commands, and defense agencies the best to provide intelligence capabilities for targeting?"<sup>99</sup>

*What is BDA?*

IDA uses the DIA definition.<sup>100</sup>

*What are the necessary characteristics of BDA?*

IDA indicates that, in addition to the characteristics of timeliness and accuracy specified in the DIA definition, completeness is needed. It notes, "Theater commanders wanted real-time information on the effects of the air

strikes in terms of remaining Iraqi warfighting capabilities. The national BDA effort was unable to make these judgments in a timely manner."<sup>101</sup>

*Who is BDA for?*

IDA sees tactical and operational decision-makers as the primary customers for BDA.

#### Joint Official Materials

Four applicable joint publications were reviewed. JP 2-0, *Joint Doctrine for Intelligence Support to Operations*, provides the doctrinal foundation for joint intelligence support to joint operations.<sup>102</sup> JP 3-0, *Doctrine for Joint Operations*, guides joint and multinational operations.<sup>103</sup> Joint publications which deal more specifically with targeting than JP 2-0 and 3-0 are in draft and unavailable for review. DIA's *Battle Damage Assessment Quick Guide* serves as a reference guide to BDA production.<sup>104</sup> Another DIA publication, a Defense Intelligence Reference Document entitled *Assured Support to Operational Commanders*, outlines specific operational intelligence requirements for various types of missions.<sup>105</sup>

*What is BDA?*

Joint Publications 2-0 and 3-0 and DIA's *Quick Guide* use DIA's definition.<sup>106</sup> DIA's *Assured Support* does not define BDA.

*What are the necessary characteristics of BDA?*

The DIA definition specifies timeliness and accuracy, but recognizes that estimation is appropriate. DIA's two publications, in their descriptions of proper BDA production, clearly advocate completeness in BDA production, and expect comprehensiveness, as well.

*Who is BDA for?*

JP 2-0 recognizes, even in its executive summary, the key role intelligence plays in targeting and the requirement for battle damage

assessment as part of intelligence targeting support.<sup>107</sup> This support is for commanders at all levels, from the Joint Force Commander on down. While JP 3-0 does not give BDA as prominent a place as does JP 2-0, JP 3-0 does recognize that the targeting process requires assessment to be effective.<sup>108</sup> The *BDA Quick Guide* names "the Commander."<sup>109</sup>

*Assured Support*, on the other hand, splits its vote between the commander and the shooter. It specifies appropriate Essential Elements of Information (EEI) which the operational commander must have to conduct or complete his mission. Two mission types which are studied are an air attack mission, and a Mechanized Infantry unit mission.

For an aircraft to complete an attack mission, the aircrew must answer the following EEI; "1. Determine the precise location of the assigned target. 2. Detect, locate, and identify threat emitters (air and missile defense systems and associated weapons) along ingress/egress routes and within the objective area. 3. Assess extent of damage to target to plan for restrike, if required."<sup>110</sup>

A ground unit's mission assessment requires that it "1. Assess enemy force intentions (attack, defend, withdraw, reinforce, delay). 2. Assess extent of damage to enemy combat units in order to plan restrike and follow-on phases of the operation."<sup>111</sup>

The air attack's assessment requirement primarily provides information for the shooter, while the ground attack's assessment focuses almost completely on the commander's future maneuver decisions.

Overall, joint official publications see the commander as the primary customer for BDA, but shooter definitely require it, too.

### Joint Materials Summary

Table 3 summarizes the review of joint materials. The appendix contains a bibliography of all joint materials used.

Table 3. Summary of Joint Perspectives of BDA

	DEFINITION	CHARACTERISTICS	CUSTOMER
<b>POPULAR</b>	Implied-measure of success of attack	1. Comprehensive 2. Complete/timely	Cdr
<b>SCHOLARLY</b>	Timely and accurate estimate of damage resulting from the application of military force. (DIA)	1. Timely/accurate 2. Complete	Cdr
<b>OFFICIAL</b>	DIA	1. Timely/accurate/ complete/ comprehensive	1. Cdrs at all levels. 2. Shooters

### V. ANALYSIS

This chapter reviews and analyses the material first by service perspective (Air Force, Army, and Joint), then by author type (popular, scholarly, and official).

#### Air Force

Nine documents produced by Air Force or Air Force-contracted personnel were reviewed. The documents cover a reasonable spectrum of Air Force thought. One captain, two lieutenant colonels, a think tank, some proposed policy, and guidance produced for all levels of Air Force personnel from the targeteer on the light table to the JFACC are represented.

Most of the Air Force materials view BDA as a significant but not overwhelmingly important product. This assessment includes the fact that only one popular article dealing with BDA could be found. Basically, unless an

Air Force member has worked directly with other services on issues involving BDA (as some of the scholarly writers have), BDA is viewed as an input into the ATO cycle, and, by extension, into the JFACC's decision-making process. BDA, in most Air Force members' minds, serves two purposes: it can improve the ability of the ATO to accomplish the JFACC's assigned mission by making the most effective use possible of the assets available, and it can save aircrews' lives by preventing them from getting sent to targets which have been successfully struck.

Some writers, however, clearly see BDA as something with even greater potential. It can also be a tool to influence the conduct of the war at the operational level and help accomplish theater and national strategic objectives. Given that air power produces most of the operational-level strikes requiring BDA, a broader view of BDA, if it can be produced, supports the JFACC at the operational-level decision-making table.

These two perceptions explain the characteristics which Air Force personnel tend to emphasize. First, timely BDA, according to the Air Force perspective, is produced within 24 hours of strike. This is the standard for timeliness because it reflects the time intelligence personnel usually need to produce reasonably accurate BDA of interdiction and strategic strikes. Often, this is put in terms of the ATO cycle since the ATO cycle is also 24 hours long (for example, see Mr. Lewis Hill's explanation of timeliness). However, the standard for timely BDA production is really more a function of how long the system takes to produce the BDA.

Accuracy is always good. Nobody wants to send aircraft after a target which has been destroyed but reported as not destroyed. Air Force personnel do not want to leave a bridge up, either, just because the last aircrew reported a good strike against it.

Completeness is another issue. It appeals to those who are trying to influence the operational level of war, since complete BDA truly explains the effects of the strikes. Full interpretation of a selected strike or set of strikes is more likely to show the operational-level impact of the effort than a quick but simple damage description. On the other hand, many Air Force personnel, especially aircrews, often see their world in terms of destroyed/not destroyed. To try to define effects beyond that is difficult and may not seem worth the effort. These personnel will down-play the value of completeness.

Comprehensiveness, on the other hand, appeals very much to nearly all Air Force personnel. If a crew chief is going to launch an aircraft, and an aircrew fly into enemy territory to strike a target, that target had better be important enough to assess. Otherwise, why risk the crew and craft going after it?

Although the JFACC is not always named as the primary customer for BDA, the most common function which Air Force materials list for BDA is the decision whether to re-strike or not. This, by definition, is a JFACC decision. If a writer has the broader, theater-wide impact perspective, however, commanders at all levels up to the Joint Force Commander and his or her J-3 are named. Three writers also assert the value of BDA for the shooters, in this case the aircrew members and their support structure.

### Army

Seventeen Army documents were reviewed, making this category the most robust of the three service perspectives. The nine popular articles were written by Army personnel ranking from non-commissioned officer to major general. The scholarly documents included a colonel and a lieutenant colonel, a think tank, and proposed policy. Official documentation ranged from basic intelligence doctrine to tactics, techniques, and procedures.

Most of the material agrees with DIA's definition of BDA. However, a few documents choose to stress the impact BDA has on overall mission execution. That is, the DIA definition can be seen as simply measuring damage. Some writers take their definitions one more step into the analysis of the results of that damage. As in the Air Force, this reveals a split between personnel who see BDA as primarily to provide feedback to the shooter, and those who see BDA as a highly valuable decision-making tool.

This split into two camps, however, is not so strong in the Army as in the Air Force, as shown by both the similar lists of characteristics, and the identified customers for BDA. Concerning characteristics, all types of Army writers agree that accuracy and timeliness are essential. Timeliness is generally not defined, but it clearly means something faster than the Air Force's 24 hours. Both the popular and scholarly writers opt for comprehensiveness and often propose ways to accomplish that goal. Official materials, perhaps reflecting what can be done right now, clearly indicate that BDA collection must be prioritized to the most important targets.

Commanders are almost always seen as the proper customers for BDA. Most commonly, the materials name the division commander, but lower (and higher) level commanders clearly have their requirements, especially for artillery and air strikes which occur in their areas of responsibility. However, a few documents claim that BDA first and foremost feeds the fire support officer, and only indirectly supports the commander. This is similar to those in the Air Force (and official Army documents from the early 1970s and before) who see BDA primarily as feedback for the shooter.

#### Joint

The joint area, with eight documents, is the most tenuous category from which to draw conclusions about perspectives on BDA. Not only are there a

limited number of documents, but only two of the documents focus on BDA. The others merely touch on the subject.

Concerning the definition of BDA, all joint authors appear comfortable with DIA's concept. Timeliness and accuracy, therefore, automatically make the grade as characteristics. If timeliness is measured, it is more likely to use the Army's "immediate" criterion than the Air Force's "24 hours." Comprehensiveness and completeness also receive votes.

Regarding the customer for BDA, as with the Army, writers identify the commander, at various levels, as the proper customer. Secondly, BDA provides feedback to shooters.

#### General Comparison Across Service

Overall, there are differences between the views of most Air Force writers and most Army writers. However, the differences tend to be in the characteristics, not in the basic concept of BDA. Joint writers tend to be closer to the Army's perspective than the Air Force's.

Most Army, joint, and Air Force authors view BDA as primarily an input for the commander's decision-making process. This tends to emphasize immediacy in timeliness, as well as, in a few instances, the apparently contradictory need for completeness. Air Force authors most often see the JFACC as the most important commander, while Army and joint authors spread their choice of commanders throughout the chain of command.

Some Air Force and a few Army and joint authors view BDA as a feedback mechanism for the shooter. This leads to a definition of timeliness which allows for reasonable accuracy, and to a desire for comprehensiveness.



## Comparisons by Author Type

### Popular

The materials used in this category are fairly comparable, allowing for a valid analysis of their similarities and differences concerning BDA. While the Air Force has only one article, it does sponsor two journals with audiences comparable to the Army and joint journals reviewed. Thus, the one article in *Airpower Journal* directly compares to the one article in *Military Review*. These two articles, both written for operational-level journals, imperfectly compare to the fact that there are no applicable articles in *Joint Forces Quarterly*, with its operational-strategic focus. The zero articles in *Weapons Review* directly corresponds to the nine articles in Army branch publications and the three articles in the *Air Land Sea Bulletin*. The implication here, especially given that BDA was the major focus of some of the Army articles but of none of the Air Force or joint articles, is that BDA in the Army is seen as a subject which is important and not yet solved, but solvable. Air Force personnel are not using popular publications as vehicles for discussion on this subject, while the joint community recognizes its existence but does not have recommendations for improving it. Basically, Air Force authors like to write about getting the bomb to the target, and about the overall effects of air campaigns, but not the connection between them.

Starting with definitions, only two popular articles define BDA. All articles appear to have a common understanding of what BDA is. This common understanding is essentially, a measure of the success of an attack.

Concerning characteristics, there is little consensus. Comprehensiveness receives the most mention, and many of the solutions offered for the BDA process involve tracking of every strike (artillery and air).

There is greater consensus, however, on who BDA is for. Nearly every writer sees his commander as the primary customer.

### Scholarly

Nine scholarly documents were reviewed. Scholarly materials reviewed are quite comparable between the Air Force and Army, and somewhat lacking in the joint category. All three perspectives have one contractor-produced paper on some aspect of BDA. In addition, the Air Force and Army categories each have one paper which is proposed policy, and two papers written by active duty officers at the senior service school level.

Concerning the definition of BDA, all accept DIA's definition except the two Army officers and one Air Force author. While they do not directly disagree with DIA, all three want to take the definition another step to explain what the battle damage does for the mission.

On characteristics, after timeliness and accuracy (from the DIA definition) comes completeness. Comprehensiveness also is often considered important.

In determining who BDA is for, the most common response is that BDA is for commanders at all levels. However, the JFACC and the Chief of the Deep Operations Coordination Cell are also named. Two scholarly authors note that shooters need feedback.

### Official

Twelve official documents were reviewed, four from each community. The documents ranged for all three perspectives from basic doctrine to technique-level guidance, and therefore have significant comparability.

DIA's definition is the most common definition. The one Air Force publication which uses a non-DIA definition, AFP 200-17, was published in 1989, well before the DIA definition was developed. On the other hand, the one

Army publication which uses a non-DIA definition, FM 71-100, was published in 1996, two years after the DIA definition became the DOD standard. FM 71-100's definition puts greater emphasis on the overall results of a strike for mission execution than does the DIA definition.

Timeliness and accuracy head the list of needed characteristics. This is followed by desire for completeness. Finally, there is a general recognition that comprehensiveness is NOT required; rather, timely and accurate BDA of important targets is more desirable.

Official documentation is more evenly divided than the other author type categories on the subject of who BDA is for. While most documents emphasize the commander, some choose the shooter.

#### General Comments Across Author Type

There is clearly less commonality by author type than by service perspective. Service perspective should be a strong influence over authors writing for service-specific publications. As it would be hoped, service perspective becomes less noticeable with regard to scholarly writers, who show significant similarity in their view. Official documentation agrees across the services to disagree. That is, official documentation fails to present a unified front within each perspective, and this disagreement remains true across perspectives.

DIA's definition is acceptable as a baseline for all types of authors, but a few scholars see the need to add to the definition to gain attention for the overall effect of a strike.

Characteristics vary widely. Interestingly, several popular and scholarly authors identified comprehensiveness as important, while official documents usually refute that claim.

All author types recognize the commander as the most significant user of BDA. However, both scholarly and official writers also make a bid for the shooter.

## VI. CONCLUSION

In response to the title question, "Do the Army and Air Force see eye-to-eye on BDA?," the answer is clearly no. However, the services themselves do not agree on BDA, nor does the joint community. Even within service official publications, there are substantial differences as to the proper definition, characteristics, and customer for BDA.

This inability to come to grips with BDA, even within services, may be most related to a fundamental struggle between whether BDA is primarily for the commander/decision-maker, or for feedback to the shooter and his support system.

This paper's historical section notes that, until the 1970's, there was only one main purpose for BDA--to support the shooter. A gradual shift toward BDA as a commander's decision-making tool culminated in DESERT STORM, where BDA drove the Joint Force Commander's decision to start ground operations. The post-DESERT STORM documents the author reviewed show that most authors, especially popular and Army authors, continue to support this view of BDA.

In the Air Force and Joint communities, especially in scholarly and official areas, however, there appears to be an undercurrent away from the commander as the primary user, and back toward the shooter. This shift toward the shooter places the commander as a second-hand user. That is, the shooter's support system, especially intelligence support, must produce assessments for the commander.

BDA which focuses on this role is probably easier to produce than BDA designed to support the commander. While timeliness and accuracy will always be required, their exact standards can be controlled by the shooters and intelligence personnel, and can therefore vary according to weapon system and intelligence requirement. Comprehensiveness, too, becomes defined by the weapon system. Some systems require BDA on less than 100% of their shots to have confidence in their performance. Completeness, on the other hand, may shift away from the battle damage assessment process and be handled within the overall combat assessment process.

Essentially, there appears to be a growing perception that what the commander really needs is combat assessment (CA), a broader view of the damage the enemy has suffered which includes BDA as a component. Intelligence should be using BDA to assist shooters in better striking their targets, and as one input into its combat assessment process. For example, LtCol Lewis (USAF), discussing the decision to begin the ground offensive in DESERT STORM, states,

It seems the measure of merit for determining the effectiveness of battlefield preparation should not have been based on the number of targets serviced on the corps commander target list. Rather the measure should have depended on whether or not each corps could execute its scheme of maneuver as planned and based on the number of friendly casualties.<sup>112</sup>

General Norman Schwarzkopf seems to agree that combat assessment, not battle damage assessment, is what the commander needs. He states,

BDA was one of the major areas of confusion and I feel that was because there were many people who felt they were in a better position to judge BDA from a pure analysis of things like photography, and that sort of thing alone, rather than allowing the theater commander...to apply good military judgment to what he is seeing.<sup>113</sup>

More study is necessary to determine the proper role for BDA at the tactical and operational levels. Shooters need feedback, and commanders need information which allows them to exercise their own military judgment. BDA may not be appropriate for both requirements. This paper has shown there is significant disagreement as to BDA's function. The division is not simply between services, but within services.

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#### Endnotes

<sup>1</sup>Department of Defense, *Final Report to Congress on the Conduct of the Persian Gulf War* (Washington, DC: Department of Defense, April 1992), 343.

<sup>2</sup>Congress, House, Oversight and Investigations Subcommittee of the Committee on Armed Services, *Intelligence Successes and Failures in Operations Desert Shield/Storm* 103d Cong., 1st sess., 1993, Committee Print, 18.

<sup>3</sup>Institute for Defense Analyses, *IDA Support to the Commission on Roles and Missions of the Armed Forces: Intelligence Support to Targeting and Battle Damage Assessment (S/NF)* (Alexandria, VA: IDA, 1995), E-9,11. All materials used in this paper are unclassified.

<sup>4</sup>DOD *Final Report*, 346.

<sup>5</sup>Kevin W. Smith, *Cockpit video: A Low Cost BDA Source*, Air University Research Report No. AU-ARI-93-1(Maxwell Air Force Base, AL: Airpower Research Institute, December 1993), 47. Also, author's personal experience with Air Force participation in operational-level exercises, especially Prairie Warrior 96 and Blue Flag 96-3.

<sup>6</sup>General Accounting Office, *Operation Desert Storm: Operation Desert Storm Air War* (Washington, DC: General Accounting Office, 02 July 1996), 6.

<sup>7</sup>Smith, 7.

<sup>8</sup>Defense Intelligence Agency (DIA), *Battle Damage Assessment (BDA) Quick Guide* (Washington, DC: DIA, February 1996), E-1.

<sup>9</sup>Joint Chiefs of Staff, Joint Publication 1, *Department of Defense Dictionary of Military and Associated Terms* (Washington: JCS, 3 January 1972), 47. The definition of bomb damage assessment is: "The determination of the effect of all air attacks on targets (e.g., bombs, rockets, or strafing)."

<sup>10</sup>Joint Pub 1, 233. The definition of post strike reconnaissance is: "Missions undertaken for the purpose of gathering information used to measure results of a strike."

<sup>11</sup>The definition of combat assessment (CA) is: "CA evaluates the friendly performance in light of objectives, ensures efficient use of force, and provides recommendations for the course of future military operations. Normally the J3 has overall responsibility for CA, however, the JFC should establish a dynamic system to conduct CA across operational and intelligence lines. CA is composed of three major components, battle damage assessment, munitions effects assessment, and reattack recommendation." Definition quoted from Nichols Research Corporation, *Bomb Damage Assessment Study: Battle Damage Assessment Simulation (BDASIM)* (Rome, New York: Rome Laboratory, Air Force Materiel Command, 1996), 48.

<sup>12</sup>DOD *Final Report* notes these two functions, at the operational and tactical levels of war, and also finds a strategic level function of BDA, to determine which national or theater options to pursue. Pg 343.

<sup>13</sup>Frank Charles Thompson, ed. *The Thompson Chain-Reference Bible, New International Version* (Indianapolis, IN: B.B. Kirkbride Bible Co., Inc., 1983), 74. (Exodus 17:11-12)

<sup>14</sup>David S. Johnson, *The Role of Tactical Reconnaissance: A Historical Perspective* (Wright-Patterson AFB, OH: Air Force Institute of Technology, 1987), 9.

<sup>15</sup>Johnson, 10.

<sup>16</sup>Bruce I. Gudmundsson, *On Artillery* (Westport, CT: Praeger Publishers, 1993), 21.

<sup>17</sup>Johnson, 11.

<sup>18</sup>Johnson, 61.

<sup>19</sup>US Army Air Forces, FM 1-20, *Tactics and Techniques of Air Reconnaissance and Observation* (Washington: US Government Printing Office, 1942), 1.

<sup>20</sup>FM 1-20, 50.

<sup>21</sup>FM 1-20, 38.

<sup>22</sup>US Army, FM 6-20, *Field Artillery Tactics and Operations* (Washington: Department of the Army, 1973), 9-1.

<sup>23</sup>US Army, FM 30-5, *Combat Intelligence* (Washington: Department of the Army, 1973), 3-32.

<sup>24</sup>US Army, FM 34-1, *Intelligence and Electronic Warfare Operations* (Washington: Department of the Army, 1984), 8-4.

<sup>25</sup>A. J. Bacevich, *The Pentomic Era: The US Army Between Korea and Vietnam* (Washington, DC: National Defense University Press, 1986), 5.

<sup>26</sup>John R. Glock, "The Evolution of Air Force Targeting," *Airpower Journal* Vol VIII No. 3 (Fall 1994): 14-28.

<sup>27</sup>Author's personal observations based on conversations with Weapons School graduates and administrators.

<sup>28</sup>Glock, 21.

<sup>29</sup>Nichols Research Corporation, *Bomb Damage Assessment Study: Battle Damage Assessment Simulation (BDASIM)* (Rome, New York: Rome Laboratory, Air Force Materiel Command, 1996), 2.

<sup>30</sup>Richard B. H. Lewis, *DESERT STORM--JFACC Problems Associated with Battlefield Preparation* (Carlisle Barracks, Pennsylvania: US Army War College, 1993), abstract.

<sup>31</sup>Smith, xiv.

<sup>32</sup>Lewis D. Hill, "Position Paper on Combat Assessment" (HQ ACC/INXU, undated, provided to the author August 1996 as a current document awaiting approval), 1.

<sup>33</sup>Nichols, 2.

<sup>34</sup>Nichols, 4.

<sup>35</sup>Smith, 7. The DIA definition, as stated, was available as a draft definition as early as March 1992.

<sup>36</sup>Hill, 2.

<sup>37</sup>Nichols, 4.

<sup>38</sup>Nichols, 8.

<sup>39</sup>Lewis, 18.

<sup>40</sup>Lewis, 15.

<sup>41</sup>Lewis, 21.

<sup>42</sup>Lewis, 30.

<sup>43</sup>Lewis, 34.

<sup>44</sup>Lewis, 34.



- <sup>45</sup>Lewis, 31.
- <sup>46</sup>Smith, 1.
- <sup>47</sup>Smith, 3.
- <sup>48</sup>Hill, 6-7.
- <sup>49</sup>Lewis, 13.
- <sup>50</sup>Lewis, 20.
- <sup>51</sup>Lewis, 22.
- <sup>52</sup>Lewis, 36.
- <sup>53</sup>Smith, 4.
- <sup>54</sup>Smith, 8.
- <sup>55</sup>U.S. Air Force, AFDD 50, *Intelligence*, CD-ROM version (Washington: HQ USAF, 1996), 3.
- <sup>56</sup>U.S. Air Force, AFI 14-207, *Air Force Targeting* (Washington: HQ USAF, 1993), 1.
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- <sup>59</sup>AFI 14-207, 3.
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- <sup>61</sup>AFP 200-17, 32.
- <sup>62</sup>*JFACC Primer*, 19, 28.
- <sup>63</sup>AFDD 50, 7.
- <sup>64</sup>AFDD 50, 11.
- <sup>65</sup>Patrick B. McNiece, "Battle Damage Assessment and the Counterfire Battle," *Military Review* 74 (April 1994): 94.
- <sup>66</sup>John P. Hightower and John J. McClain, "BDA Analysis: Using Automation to Speed the Process," *Military Intelligence* 20 (July-Sep 94): 31.

<sup>67</sup>Harold T. Harvey, "Division Targeting Cell Meetings: Are Yours Productive?" *Field Artillery* (June 1994): 29.

<sup>68</sup>Hightower, 30.

<sup>69</sup> Bevilacqua Research Corporation, *Final Technical Report: Development and Demonstration of a Multi-Level Neural Network for Battle Damage Assessment* (Huntsville, AL: Bevilacqua Research Corporation, 1995).

<sup>70</sup>David W. Cammons, *US Army Intelligence in Support of the 100-Hour War: Fact or Fiction/Myth or Reality?* (Ft. Leavenworth, KS: US Army School of Advanced Military Studies, 1995).

<sup>71</sup>Steven A. Epkins, *A Division G2's Perspective on Operations Desert Shield and Desert Storm* (Carlisle Barracks, PA: US Army War College, 1992).

<sup>72</sup>US Army Intelligence Center (USAIC) and Fort Huachuca, *Proposed Doctrine and Tactics, Techniques, and Procedures for Army Battle Damage Assessment* (Ft Huachuca, AZ: US Army Intelligence Center, 1993). The editor of *Military Intelligence* reports its use in the production of the current FM 34-1 in *Military Intelligence* 21 no. 3 (Jul-Sep 95): 5.

<sup>73</sup>Bevilacqua, 2.

<sup>74</sup>Bevilacqua, 3.

<sup>75</sup>Cammons, 15.

<sup>76</sup>Epkins, 9.

<sup>77</sup>USAIC, 1-1.

<sup>78</sup>Bevilacqua, 5.

<sup>79</sup>Cammons, 15.

<sup>80</sup>Cammons, 40.

<sup>81</sup>Epkins, 9.

<sup>82</sup>Epkins, 33.

<sup>83</sup>USAIC, 1-9.

<sup>84</sup>USAIC, 2-4.

<sup>85</sup>USAIC, 2-5.

<sup>86</sup>Bevilacqua, 4.

<sup>87</sup>Cammons, 15.

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<sup>89</sup>U.S. Army, FM 34-1, *Intelligence and Electronic Warfare Operations* (Washington: HQ DA, 1994), iii.

<sup>90</sup>U.S. Army, FM 34-130, *Intelligence Preparation of the Battlefield* (Washington: HQ DA, 1994), iv.

<sup>91</sup>U.S. Army, FM 6-20-10, *Tactics, Techniques, and Procedures for the Targeting Process* (Washington: HQ DA, 1996), vii.

<sup>92</sup>US Army, FM 71-100, *Division Operations* (Washington: HQ DA, 1996), iv.

<sup>93</sup>FM 34-1, Glossary-4; FM 34-130, Glossary-4; FM 6-20-10, 2-14.

<sup>94</sup>FM 71-100, 2-19.

<sup>95</sup>FM 34-1, 2-15; FM 6-20-10, 2-15.

<sup>96</sup>FM 6-20-10, 2-14.

<sup>97</sup>FM 71-100, 2-19.

<sup>98</sup>Phil Ruhlman, "Operational Joint Targeting Procedures," *The Air Land Sea Bulletin* 95-3 (November 1995), 12.

<sup>99</sup>IDA, 1.

<sup>100</sup>IDA, E-2.

<sup>101</sup>IDA, E-8.

<sup>102</sup>Joint Chiefs of Staff, JP 2-0 *Joint Doctrine for Intelligence Support to Operations* (Washington: JCS, 5 May 1995), i.

<sup>103</sup>JCS, JP 3-0 Doctrine for Joint Operations (Washington: JCS, 1 February 1995), i.

<sup>104</sup>DIA *Quick Guide*, v.

<sup>105</sup>Defense Intelligence Agency (DIA), *Assured Support to Operational Commanders (S/NF)* (Washington, DC: DIA, July 1994) All materials extracted from this document are unclassified.

<sup>106</sup>JP 2-0, GL-4; JP 3-0, GL-3.

<sup>107</sup>JP 2-0, x.

<sup>108</sup>JP 3-0, III-26.

<sup>109</sup>DIA *Quick Guide*, 3.

<sup>110</sup>DIA *Assured Support*, 4-7, 8.

<sup>111</sup>DIA *Assured Support*, 6-3, 4.

<sup>112</sup>Lewis, 36.

<sup>113</sup>Cong., *Intelligence Successes*, 29. General Schwarzkopf's comments were made before Congress on June 12, 1991.

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